IRM Searching CINFO
Simple optimization scheme
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The CINFO system table is used to house information that is needed by only a few analog channels, most notably fast digitizer plotting parameters. The CINFOEntry routine (or CINFOentry in the PowerPC version) searches the table for a match on a given channel number and entry type. A key user for these searches is FTPM, the local application that supports the FTPMAN Acnet protocol. During the evolution of the PowerPC version of the system code, it was found that searches of this table can be very time-consuming, because its default size was 512 entries, and FTPM may have to search it multiple times for each device presented for consideration. A query involving 4 devices, for which no matches were found, cost the PowerPC 16 ms! Something had to be done, and it was, with the result described in the documents, *CINFO Search* and in more detail, *CINFO Scanning*. The same implementation was not done for the IRM, as the IRM did not have the same problem with slow access to nonvolatile memory.

A new diagnostic has been added to FTPM that, in the course of logging the occurrence of requests, notes the elapsed time spent processing those requests. Armed with measurements made with this new FTPM diagnostic, it seems to typically take 2–2.5 ms to do a simple timing query (FTPMAN protocol type code 1). After some investigation, this involves multiple searches of the CINFO table. This means that something should be done for the IRM.

It is all in the numbers. If we have 512 entries in the CINFO table, every search will inspect that many entries, even if most (nearly all) of them are empty. So, instead of replicating the fairly complicated scheme used for the PowerPC, a new simpler scheme was devised. The idea is to notice online how long the table appears to be. This is done as a by-product of an unsuccessful search of that table. Merely note the last nonzero entry found. If the entire table is searched, as when no match is found, compute the entry number for that last nonzero entry, and add 6. If the result is less than the declared number of CINFO entries as stated in the *nonvolatile* system table directory, then replace the number of entries by that value in the *online* copy of the system table directory; otherwise, set the online size to match the nonvolatile size. The next time a search is performed via CINFOEntry, fewer entries may be searched, as the empty entries, presumably on the end, will be ignored.

By adding 6 in the above logic, the search extends slightly beyond the last known end of the table. If someone adds to the table, normally done manually via the Memory Dump page application, then the logic should slowly take note of it and increase accordingly, assuming such failed CINFO table searches take place from time to time.

Note that the scheme only works for failed searches. For any successful search, this logic does not apply, since the search ends at the point of finding a match. In practice, there are lots of failed searches, as Acnet clients routinely query the front end about many devices, just to see what snapshot capabilities exist.

In the improved scheme for a node that has only a very few CINFO entries, the time to perform a simple timing protocol query dropped from about 2.5 ms to 0.8 ms.